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Development of the lunar gravity field model GrazLGM300b in the framework of project GRAZIL

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The objective of project GRAZIL is to compile a high-accurate gravity field model of the Moon based on measurements provided by the Gravity Recovery And Interior Laboratory (GRAIL) mission. In order to reach this goal we perform dynamic precise orbit determination from radio science observations (Doppler range-rates) in combination with the analysis of inter-satellite ranging observations.
We present an updated version of the lunar gravity field models GrazLGM200a (Klinger et al. 2014; doi: 10.1016/j.pss.2013.12.001) and GrazLGM300a (prepared for the 2014 AGU Fall Meeting) derived from inter-satellite Ka-band ranging (KBR) observations collected by GRAIL during the primary mission phase (March 1 to May 29, 2012). We exploit the KBR data by an integral equation approach using short orbital arcs. The basic idea behind this technique is to reformulate Newton's equation of motion as a boundary value problem. In this contribution particular attention is paid to processing details associated with the error structure of the observations and the incorporation of non-gravitational accelerations (with emphasis on solar radiation pressure, lunar albedo and self-shadowing). We validate our results against recent GRAIL models computed at NASA-GSFC and NASA-JPL.